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## (54) IMPROVEMENTS IN OPERATING MECHANISMS FOR OUTLET MECHANISMS OF FLUID CONTAINERS

(71) We, DR. KARL THOMAE G.m.b.H., a German Company, of D-7950, Biberach an der Riss, Germany, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to an operating mechanism for an outlet mechanism of a fluid container for example an aerosol can or a fluid container having a manually operable pump mechanism for extracting the fluid.

This invention has particular though not exclusive application to containers of fluid medicament which is ejected by a pump mechanism from the container in doses as a fine spray.

The present invention provides an apparatus mechanism for an outlet mechanism of a fluid container, the operating mechanism having a body member and a finger operable member movable relative to the body member between first and second positions, a plurality of resilient elements connected to one of said members and positioned to abut one or more abutments of the other of said members by way of a wedge or cam surface or surfaces disposed on said resilient elements or said one or more abutments, said elements and abutment or abutments being so disposed and arranged that when pressure is exerted on said finger operable member, said resilient elements flex freely under compression in a direction transverse to the direction of movement of the finger operable member and there being no obstruction to such flexing movement, and when said pressure reaches a predetermined level, the flexed resilient elements spring out of engagement with the abutment or abutments so that the finger operable member moves between said first and second positions with a snap-action for operating the outlet mechanism.

Where a mechanism according to the invention is used with a medicament con-

tainer as described above, a predetermined and reproducible spray droplet size spectrum can be provided.

The present invention thus extends to a container of a fluid medicament having a pump mechanism operable by an operating mechanism as aforesaid.

The body member may comprise a screw cap for attachment to a suitable container or may comprise the wall of the container itself where the operating mechanism is integral with the container.

The resilient elements are preferably formed as upstanding segments with wedge portions at their free ends and are preferably disposed in a ring about the finger operable member or the body member.

Preferred embodiments of the invention will now be described with reference to the accompanying drawings wherein:—

Figure 1 is a side view partly in section of a first embodiment of an operating mechanism for operating the pump mechanism of a fluid medicament container; and

Figure 2 is a similar view of a second embodiment.

Referring to Figure 1, the operating mechanism has a body 2 comprising a screw cap with an internal thread 4 for attachment to a fluid medicament container. A finger operable member 6 is formed as a cap and is mounted on an outlet pipe 8 of a pump mechanism of the container. Cap 6 has a radial outlet bore 10 communicating with the pipe. Cap 6 is movable from a first position shown to a second position in which its annular bottom edge 12 abuts an annular shoulder 14 of cap 2.

Cap 6 has an internal shoulder 16 slightly upwardly inclined and an inner surface portion 18 thereabove tapering inwardly towards the top of the cap. Shoulder 16 abuts resilient segments 20 of screw cap 2. Segments 20 are upstanding from the top of screw cap 2 and are formed as segments of a broken ring extending around the top of screw cap 2. Each segment has at its free end an outwardly extending wedge

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portion 22 which abuts against shoulder 16.

In operation, finger pressure is applied to cap 6. This causes segments 20 to flex freely inwardly along their length i.e. in a direction transverse to the direction of movement of the figure operable member, as a result of the compression exerted on wedge portion 22 by shoulder 16. There is no obstruction to such flexing movement in view of the clearance between the segments 20 and pipe 8. There is no substantial movement of cap 6 until at a predetermined pressure level, wedge portions 22 begin to move and are forced to spring out of engagement with shoulder 16. The finger pressure then being applied to cap 6 forces the cap with a snap-action to the position in which edge 12 abuts shoulder 14 and in which the pump mechanism ejects under the finger pressure a dose of medicament in the form of a spray from outlet bore 10. Since the finger pressure causing the pump to operate is predetermined as the pressure required to disengage segments 22 from shoulder 16, a predetermined and reproducible spray droplet size spectrum is provided. Tapering surface portion 18 allows cap 6 to slide smoothly back to the first position, under the action of a restoring spring in the pump mechanism, when finger pressure is released from the cap 6.

The second embodiment shown in Fig. 2 is generally similar to the first embodiment and similar parts are denoted by the same reference numerals. Cap 6 has a bottom part 30 slidably fitting over an annular boss 32 of screw cap 2. The bottom edge 34 of cap 6 tapers outwardly to an outer surface portion 36 which tapers slightly outwardly towards the top of the cap. Resilient segments 20 are similar to those of the first embodiment, apart from being wider, but are disposed in a ring about the perimeter of screw cap 2 and are inwardly facing so that wedge portions 22 abut with edge 34. In operation of this second embodiment, sufficient finger pressure on cap 6 causes segments 20 to be pushed outwardly to allow cap 6 to move downwardly with a snap action in precisely the same manner as in the first embodiment.

#### WHAT WE CLAIM IS:—

1. An operating mechanism for an outlet mechanism of a fluid container, the operating mechanism having a body member and a finger operable member movable relative to the body member between first and second positions, a plurality of resilient elements connected to one of said members and posi-

tioned to abut one or more abutments of the other of said members by way of a wedge or cam surface or surfaces disposed on said resilient elements or said one or more abutments, said elements and abutment or abutments being so disposed and arranged that when pressure is exerted on said finger operable member, said resilient elements flex freely under compression in a direction transverse to the direction of movement of the finger operable member and there being no obstruction to such flexing movement, and when said pressure reaches a predetermined level, the flexed resilient elements spring out of engagement with the abutment or abutments so that the finger operable member moves between said first and second positions with a snap-action for operating the outlet mechanism.

2. A mechanism as claimed in claim 1 wherein the or each resilient element comprises an upstanding segment having at its free end a wedge portion for engaging an abutment.

3. A mechanism as claimed in claim 1 or 2 wherein the resilient elements and abutments have cooperating wedge surfaces.

4. A mechanism as claimed in any preceding claim wherein the other of said members has a tapering surface portion adjacent said abutment(s) to allow the resilient elements to slide easily thereover when they are forced out of engagement with the abutments.

5. A mechanism as claimed in any preceding claim wherein a plurality of resilient elements are disposed in a ring.

6. A mechanism as claimed in claim 5 wherein said abutment comprises an annular shoulder for engaging the ring of resilient elements.

7. A mechanism as claimed in claim 6 wherein said resilient elements are disposed on said body member and said finger operable member comprises a cap slidable towards said body member and arranged to move the resilient elements within the cap during the snap action.

8. A mechanism as claimed in claim 6 wherein said resilient elements are disposed on said body member and said finger operable member is slidable towards said body member and arranged to move the resilient elements so that the finger operable member moves within the ring during the snap action.

9. A mechanism as claimed in any preceding claim wherein said body member comprises a screw cap for connection with a fluid container.

10. Operating mechanisms substantially

as described with reference to the accompanying drawings.

11. A container of fluid medicament having a pump mechanism operable by an operating mechanism, the operating mechanism being as claimed in any preceding claim.

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